THE MOTOR AGE

THE AUTOMOBILE AUTHORITY OF AMERICA

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LEADING CONTENTS

CLEVELAND'S GALA DAY

AN AUTOMOBILE PARADE AND AUTOMOBILE RACES AROUND THE PUBLIC SQUARE ECLIPSE ALL OTHER ATTRACTIONS—WINTON THE HERO OF THE OCCASION

Cleveland, Oct. 15.—Last Wednesday was a gala day for local automobile enthusiasts, being down on the program of "Home Week" celebration as automobile day. The improved mode of transportation is attracting greater public interest than the bicycle ever did and the crowds that thronged the leading streets of the city were denser on that day than at any time during the week.

First there was an automobile parade which was participated in by a representative number of local vehicle owners; in fact, it was by far the largest event of the kind this city has ever witnessed, there being over forty vehicles in line. The event was under the auspices of the Cleveland Automobile Club and its members were in the lead. For those familiar with the game the most interesting object of the parade was Alexander Winton in his famous racing machine. As a display of the different types of vehicles it was a great success, as there were all the extremes of the various ideas of construction.

Walter Baker, in a neat little electric runabout, was chief marshal of the pa-

rade and he was successful in maintaining excellent "marching" order.

The Race a Success

The automobile race around the public square astonished everyone. The writer wants to retract what he remarked in the last issue regarding the possibilities of a high rate of speed over a course of one-eighth of a mile on a side including some of the worst pavements in the city and packed by thousands of spectators. Five times the half-mile course was covered at a two-minute pace, and it can be appreciated almost without saying that probably the only combination in the country capable of such an exhibition was Alexander Winton and his famous hydrocarbon flying machine.

A Hair-Raising Spectacle

It was purely an exhibition for the competitor placed in the "race" to make the event interesting had not the nerve to let his machine out or to take the corners at high speed and he finished a loser by almost a lap. Viewed from a window in one of the tall office buildings on the square, the spectacle was almost hair raising. With car tracks crossing in every direction and with cobble stone pavements on two sides, the champion's machine seemed to touch the ground scarcely more than half the time.

Crowds in Danger

Despite the frantic efforts of a cordon of police, the crowds persisted in forcing their way almost to the center of the street, only to be swept back when the machines came around. That some of the spectators were not injured can only be considered providential, but Winton held the corners with marvelous skill. His time was 5:15, and that of A. C. Ingalls 5:45. Winton made two laps in exactly one minute each.

An Obstacle Race

After the speed exhibition there was an obstacle race in which Winton, Ingalls and Schreiver Reese competed. Ingalls and Reese ran a dead heat in 2:37, and in the run-off Reese won in 2:30. The event seemed to indicate that the side steering device as used on the winners Locomobile is superior to either the wheel or the center handle bars used by his competitors, as far as quick and accurate movements are concerned. This was the first event of the kind ever witnessed in Cleveland and it attracted much attention. The Cleveland Automobile Club members declined to have anything to do with either of the races, consequently the number of competitors was small.

MAY OPEN CENTRAL PARK

New York, Oct. 13.—It is understood that the park commissioners are considering rules and regulations for throwing open Central Park to the automobilers very shortly and thus heading off the fight in the courts that prominent motor-vehicle owners are now organized to make to test their rights.

Politics has been at the bottom of this unfriendliness to automobilers by the park board. There is a powerful association with considerable political influence known as the Liberty Dawn Association behind the official opposition to opening the parks. This association is an organization of hack drivers, who have feared the electric cabs would come in as competitors for the park service. It is understood that the opposition of the Liberty Dawn jehus has been toned down some and that the commissioners consequently feel more at liberty to take the action hinted at above.

There has been some talk of a compromise by throwing open the West drive to the automobilers. This is far from the liberal concession recently made at Fairmount Park, Philadelphia, where all the drives except the Wissahickon are now auto roads.

There is little chance that the New Yorkers will accept any compromise of this "bone to a hungry dog" character. On the other hand, it is probable that unless the parks be opened to them at once they will proceed to make a test case and carry it to the appellate courts to determine fully what discretionary

power the park commissioners have in the matter.

An All-Around Sportsman

While Albert C. Bostwick's record breaking Panhard is at the storage station along with Bishop's and Vanderbilt's cars and he finds time for an occasional spin in it, the young millionaire is, for the moment, turning his attention to other lines of sport.

"I've just fitted up a complete repair shop in my Mamaroneck stable," said he to The Motor Age representative, "but I am now giving much attention to the stable of trotters I have just bought. They are dandies, let me tell you. Then, of course, I am getting my horses ready for the horse show. I am also dabbling a little in motor launches, so you see I am a little too busy to talk racing now."

Auto Club Election

The Board of Governors of the Automobile Club of America has put in nomination the following for officers, to be voted upon at the annual election on October 22:

For president, Albert R. Shattuck; first vice-president, Gen. George Moore Smith; second vice-president, J. Dunbar Wright; third vice-president, David Wolfe Bishop; treasurer, Winslow E. Buzby; secretary, Whitney Lyon; governors for class of 1903, Albert C. Bostwick, Charles P. Doelger and Dave E. Morris.

A friendly contest is likely to ensue, as it is said that several opposition tickets will be in the field.

It was incorrectly reported that Astor Court had been chosen for the new club rooms. As a matter of fact, the selection of them will be left to the new board of officers.

"Not for Willie"

Ridiculous but persistently printed rumors that W. K. Vanderbilt, Jr., was to start from the Waldorf-Astoria at three o'clock today in an endeavor to ride to Minneapolis, Minn., in fifteen days on a bet of ten thousand dollars, attracted a crowd of reporters and others to the famous carravansary. Of course nothing was heard or seen of Mr. Vanderbilt. Cyclists naturally laughed at the idea of an automobiler calling a hundred-mile-a-day run a feat worth making a wager about. There were others to laugh with them.

An Advertising Car

The advertising octopus has reached out its arms and gathered in the motor-vehicle for its publicity purposes. An automobile advertising company has begun operations here. It has large electric trucks with the sides raised to sign board dimensions. These sides are divided into sections, each of which carries an elaborately painted advertisement. The big car attracts much attention on its trip through the main thoroughfares and it is to be inferred that the signs thereon receive their share of notice.

FAST MOTOCYCLE PACED RACES

The week's cycle and motocycle races opened in Chicago last Monday evening at the magnificent Coliseum under the management of J. C. Kennedy, the well known promoter. The early days were marked by excellent racing, but only a fair attendance, the latter owing, no doubt, to election excitement. John S. Prince was responsible for the construction of an ideal ten-lap track.

The events of the meet were a series of fifteen-mile motor paced races between the middle distance racing stars, in which most of the indoor records were broken. The fastest of these races was that of Monday evening, between the 1900 star, Johnny Nelson, and the veteran, E. A. McDuffie. The latter got off in the lead, which he held for nine miles, warding off several attempts of his opponent to pass him the first six. On the seventh mile Nelson's pacing tandem went wrong and before he got another machine he lost two laps. On the tenth mile McDuffie's fast work began to tell on him and he lost his pace repeatedly thereafter, while Nelson, with his new motor, regained the lost distance, and at the finish was nearly two

laps in the lead. The following table gives the details of the event:

Dis.	Leader.	Time.	Previous Record.
1	McDuffie.....	1:58	1:47 1-5
2	McDuffie.....	3:46 3-5	3:52
3	McDuffie.....	3:39	5:44 4-5
4	McDuffie.....	7:21	7:32
5	McDuffie.....	9:10 2-5	9:26 4-5
6	McDuffie.....	10:52 2-5	11:18 2-5
7	McDuffie.....	12:45 1-5	13:13 4-5
8	McDuffie.....	14:40	15:08 2-5
9	McDuffie.....	16:28	17:03
10	Nelson.....	18:32 2-5	18:57 3-5
11	Nelson.....	20:20 2-5	20:52 2-5
12	Nelson.....	22:11 1-5	22:47 3-5
13	Nelson.....	24:03 1-5	24:44 2-5
14	Nelson.....	25:50 4-5	26:40 3-5
15	Nelson.....	27:36	28:32 4-5

Following a motor tandem, Jimmy Michael established a new indoor record for one mile, going the route in 1:40 flat. A two-mile motor tandem pursuit race was won by Crooks and Stone by nearly half a lap from Newkirk and Dyer, in 3:17 1-5.

On Tuesday evening John T. Fisher won a fifteen-mile motor paced race from Charles W. Miller in 28:47. Fisher got the lead at the start and maintained it all through, gaining several laps on Miller when the latter lost his pace in the seventh mile. Three miles from the finish Fisher's tandem went wrong and he made a plucky ride during the long delay in getting a fresh pacing machine on the track, trailing Miller for part of the distance and riding alone for part of it. He eventually won by a lap and a half.

The same evening George Leander won a five-mile paced race from Johnny Lake, the amateur champion, fairly riding him off his feet in 9:26 4-5. Lake got off first and held the lead for three miles, which was ridden in 5:31 1-5, but the pace was too much for him and he lost his motor on the fourth mile, after which Leander had things all his own way.

In a two-mile motor tandem race Newkirk and Dyer won from Hoyt and Ruel in 3:20 4-5.

AUTOMOBILE STABLE BURNED

Florence O'Neill, the proprietor of the Pittsburg Dispatch, mourns the loss by fire of his new and elegantly equipped automobile stable, in which there were two electric vehicles and a gas engine charging outfit. The vehicles were a Waverley mail phaeton and a light, high speed phaeton made by the Riker company to the especial order of Mr. O'Neill.

CHINESE AUTOMOBILE WEDDING

Automobile weddings have become so common as to attract no further attention, until Chicago has come out with a hitherto unheard-of variety in the shape of a Chinese automobile wedding. Moy Ing, a prosperous Celestial restaurant keeper, took Sella Yoy to wife with the aid of an automobile, and now the pair are the wonder of Chinatown.

MOTOR AMBULANCE FOR WASHINGTON

Washington, Oct. 14.—An effort will be made during the coming session of congress to secure an appropriation of $3,000 for the purchase of a motor ambulance for the police department. The superintendent has included this sum in his budget of estimates for the year and will make a personal effort to secure it.

GERMAN MOTOR MISCELLANY

Berlin, Sept. 24.—A Swiss magistrate has forbidden the use of automobiles on the roads and streets throughout the entire canton over which he presides.

The German imperial motor-car, which is a twenty-eight-horsepower Daimler, recently turned over backward while being run up a steep hill by several gentlemen belonging to the emperor's suite. Extensive repairs at the factory were necessary.

H. D. Bussbarth, a member of a well known Munich automobile firm, established a new twenty-four-hour record for motor-vehicles September 9 and 10, covering 590 kilometers in that time. He used a five-horsepower machine.

A well known Dresden dairy is sending out its milk, cream, butter, cheese and other products in automobiles; and its example will shortly be followed by Berlin's most extensive milk supply firm. Thus the sharp, decisive ringing of the motor-vehicle alarm will supersede the

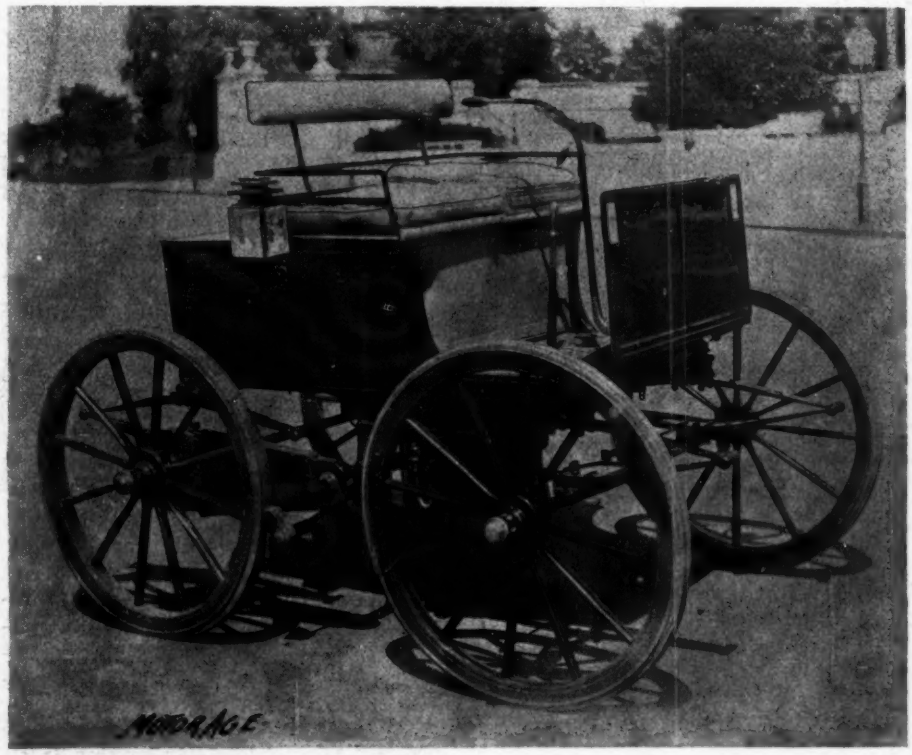
clanging peals of the hand bell as a warning for housewives that "the milk man has came."

The royal military maneuvers during the early part of the month brought no less than nine motor-vehicles, all of them of the hydrocarbon type, into action. The war office also had in use at the time a ten-horsepower Daimler, which afforded accommodation for nine passengers. The emperor's big machine naturally attracted chief attention. On account of numerous accidents during the tournament of 1899 fifty percent of the motor-vehicles were rendered useless. The marked improvement in the behavior of the vehicles this year augurs well for their permanent use in the German army.

AUTO-DYNAMIC CO.'S VEHICLE

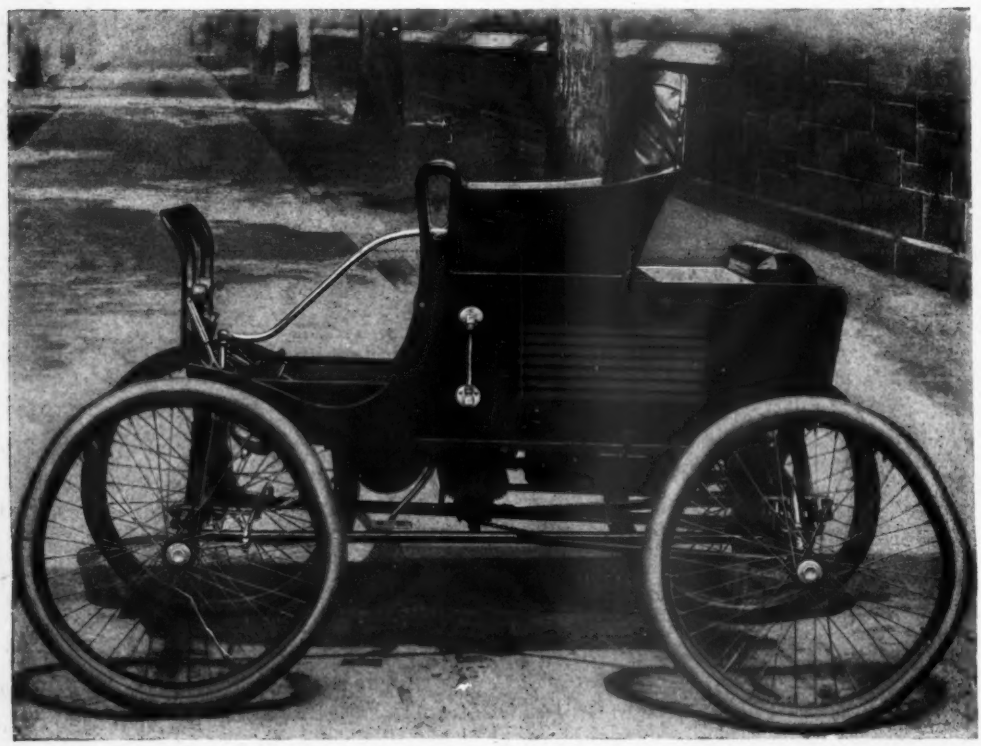
The neat little trap shown in the accompanying illustration has been in service on the streets of New York for several months. It is made by the Auto-Dynamic Co., at their factory, 140 West Thirty-ninth Street. The vehicle weighs 1,800 pounds and is equipped with storage batteries of their company's own manufacture. The tires, controller, etc., are covered by patents owned by the company and embody several novel features.

This company has been quietly at work for several months, and has other designs in electric vehicles which will shortly be brought out, and they promise to become an important factor in the automobile business. Frank Tilford is president, Thomas W. Stevens treasurer and Arthur L. Stevens, general manager of the company.



THE READING STEAM VEHICLE

The accompanying illustration shows a steam vehicle manufactured by the Steam Vehicle Co. of America of 253 Broadway, New York, the pleasing lines of which will appeal to the readers of The Motor Age. In speaking of the vehicle, President Schwarzenbach gave the following particulars.



THE READING STEAM VEHICLE.

In constructing their vehicles the company have striven, primarily, after simplicity and strength, but in so doing have neglected nothing that would add to the general appearance of the vehicle, as shown by the illustration, and have spared no pains to give a high finish that will appeal to the most fastidious. The carriage has been christened the "Reading."

The company own a number of patents on automobile construction and have introduced into their product a number of novelties. Novel features that tend toward complication have, however, been studiously avoided. Too many motor vehicles, according to Mr. Schwarzenbach, embody so-called novelties and improvements that appeal to inexperienced purchasers—novelties which, in theory, appear to be valuable, but which, in practice, prove only dangerous.

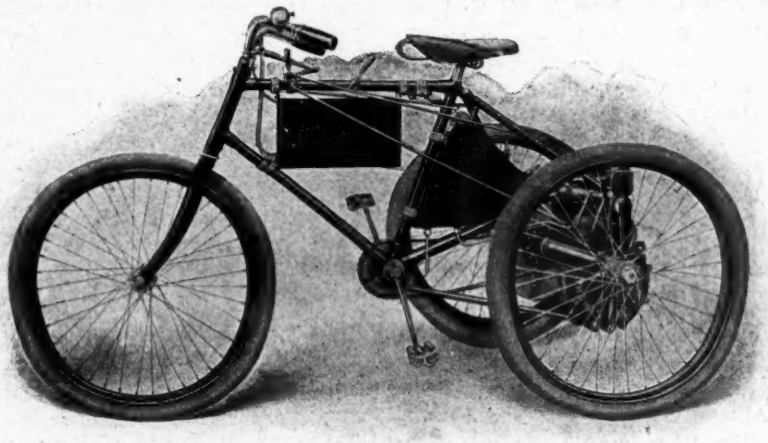
The radical advantages claimed for the Reading vehicle by their makers is an entirely new type of engine, having four cylinders and a new valve motion, covered by patents. The engine develops 5¾ horsepower. Its advantages lie in its simplicity, the lack of attention required by it, and its perfectly balanced motion.

Each vehicle is equipped with an automatic water pump, an auxiliary hand pump, auxiliary throttle, and a water column. The boiler capacity is extra large and the water and fuel tanks are considerably more capacious than usual.

In addition to the style of vehicle illustrated, the company is turning out pleasure vehicles and delivery wagons, ranging in price from $700 to $1,000.

THE E. R. THOMAS MOTOCYCLES

The first of the two accompanying illustrations shows the motor tricycle of the E. R. Thomas Motor Co., on which the company are already filling orders. The company have taken plenty of time in preparing to place their goods on the market, and now that they have come before the buying public, are doing so with an energy that is commendable.



THE THOMAS AUTOTRI.

The two styles of motor bicycles of this company have already been described in the columns of The Motor Age. In addition to the complete machines—the bicycles, the "Autotri," and the "Autotwo," which last two will be described further on—the company supplies to the trade a line of air-cooled gasolene motors of 1½, 2¼ and 3 indicated horsepower, and in their supply department carry everything that is needed in the construction of motocycles. The line of supplies includes aluminum crank and gear cases, spur gears, compensating gears, friction clutches, carbureters, mufflers, induction coils, batteries, sparking plugs and levers, as well as brackets, lamps, bells, et cetera. With the parts they furnish blue prints and make it a point to render to customers every possible assistance in order that the work undertaken may be done in an intelligent and practical manner.

The Autotri is the name that the company have adopted for their tricycle of the accepted French type, although it is the first complete tricycle that has been manufactured in America. Their machine is no experiment and it was exhibited and obtained a prize medal at the Toronto Industrial Exhibition in 1899.

Features of special construction are noticeable throughout the machine. The frame is strongly reinforced at every point, and provision has been made for withstanding every strain. The Thomas "safety front fork" consists of a heavy crown and four fork sides of heavy

gauge, two running to the fork crown in the manner of ordinary bicycle construction and the other two running up to the top of the fork stem, where they are secured in the handle bar binder.

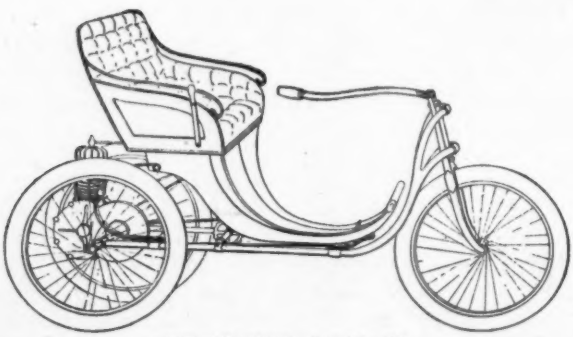
The Autotri is equipped with a Thomas motor of three indicated horsepower, which gives a speed that can be varied from five to twenty-five miles an hour, with a sufficient reserve power for all ordinary grades. The supply tank holds one gallon of gasolene and the carbureter three quarts more. In a recent test at Buffalo, 100 miles were covered with one gallon of the fluid.

By the use of the Thomas silencer an almost noiseless exhaust is secured. The control of the machine is all that can be desired. Compensating gear on the rear axle allows sharp corners to be turned with safety, and the machine is easily steered. A powerful band brake operating on the rear shaft provides absolute safety.

The weight of the Autotri complete does not exceed 200 pounds. The dimensions are: Length over all, 5 feet 6 inches; width, 40 inches; height, 39 inches. The highest bicycle finish prevails throughout and the machine presents a neat and pleasing appearance. The Autotri will retail for $350.

The Autotri is convertible into a quadricycle, the "Autoquad," by removing the front wheel and securing the front forks to a two-wheeled quadricycle attachment, fitted with a comfortable seat. The two longitudinal shafts are secured to the rear axle, and the result is a strong, compact and rigid machine for two persons. The Thomas company make a specialty of these quadricycles for rapid deliveries, a rectangular box being substituted for the seat in this case. The box can be made in special design to advertise different lines of business. The Autoquad sells for $450.

Under the name of the Autotwo the Thomas company have placed upon the market a light motor carriage of a graceful and pleasing design shown in the accompanying illustration. The Autotwo is equipped with a three indicated horsepower, air-cooled motor, giving ample power for every purpose. The gasolene supply, induction coil, batteries, etc., are placed beneath the seat, removed from view, and are accessible by lifting the seat, which is hinged for the purpose. The Autotwo will carry two persons at a speed of twelve miles per hour and it is claimed to be an ideal vehicle for family use. Crank starting is used, and the motor is equipped with a fraction clutch and can be thrown out of gear by a lever from the seat. The dimensions are: Length over all, 6 feet 10 inches; width, 40 inches; height, 55 inches. The vehicle is finished in the very finest style and sells for $475.



THE THOMAS AUTOTWO.

ABOUT MOTOR SPEED AND CHANGE GEARS

A STUDY OF PROBLEMS INVOLVED IN REGULATING THE SPEED OF MOTOR VEHICLES BY CHANGING THE SPEED OF THE MOTORS.

BY M. C. KRARUP

Given a motor—whether a steam or gasolene engine—which can be operated at almost any desired piston speed by means of a steam throttle and cut-off or vapor throttle and spark timing device, what is the requirement in regard to gear-change devices for motor-vehicle purposes?

Every constructor of steam or gasolene motor-vehicles has had occasion to ask himself this question and has found it necessary to answer it more or less definitely before proceeding very far with construction work. Moreover, it is one of the questions in which the purchasers of motor-vehicles find themselves deeply interested—sometimes without knowing the question in that form—after they have bought a vehicle and discover that for some reason or other a seven-horsepower engine sometimes gets stalled on a hill that a span of horses would easily climb with the same load.

Prevalent Lack of Knowledge

Knowing that the Motor Age has a great number of lay readers who do not pretend to have settled all questions that might be of interest to them as prospective customers for motor-vehicles, to their own complete satisfaction, I shall try to present a few thoughts and observations on this subject which I find that people outside of the industry in only very rare cases have thought it worth their while to examine. They are ordinarily told that while a horsepower is somewhere near a horse's average traction effort, "a horse can for a short time develop a power five and even ten times greater," and this is commonly accepted as sufficient explanation of the engine's failure, the fact, notwithstanding, that a cold calculation of the work required for climbing the hill that stalled the seven-brake-horsepower engine, shows no more than, say, two horsepower to be needed. It may be a little disconcerting, also, the find that the electric vehicle, which weighs perhaps twice or three times as much per horsepower, climbs the same hill "without an effort," loaning the system of electric traction a very showy point of superiority, the offset to which is not so very easily demonstrated and naturally escapes public attention. The fact remains that electric vehicles with only one reduction gear do climb hills that steam and gasolene vehicles of the same weight cannot be driven over, unless they are fitted with variable speed reduction gearing that permits the vehicles to move slowly while the motor runs at top speed.

The Problem of Speed Gears

The problem of speed gears has become acute in the United States only since the tendency to do away with them as much as possible commenced to be felt. So long as the French system was implicitly accepted there could be no question of how few speed gears one could get along with, for the pioneer French system consisted in running the motor at all times at a power and rate of fuel consumption equal to the greatest traction effort that might be required in any emergency likely to arise, while ordinarily utilizing only a small percentage of this power and allowing the rest to go to waste in stresses upon material of motor and running gear. Every speed change being effected by gearing, and the motor never checked by the load or by throttling the explosive charge or timing the spark, but always by the governor, there could be no question of not having change gears enough. They were compulsory and the levers for manipulating them were numerous and conspicuous.

And to this day many French vehicles

of the larger types are operated on this principle with only minor modifications. The logical French mind sees no escape from the proposition that if one wants to be able to drive at any reasonable speed—especially not faster than he wishes—under any conditions of travel, he must always be able to commute the high speed of the motor into slow power at the wheels and never permit the slow speed of the vehicle, which may be compelled by circumstances beyond his control, to drag the speed of the motor down below the point where it has power enough—and to spare—for the work in hand. True to this principle, the French engineers largely continue to stick to the multiplicity of mechanical speed gears, and enjoy the satisfaction that they always have available nearly the full horsepower for which the motor is constructed.

Gearing Undesirable

The logic is good, but that only proves that that is a very insufficient guide to practical results. Practice has decreed that speed gears must be reduced to a minimum because they constitute an intolerable incumbrance in the way of complication, weight, unsightliness, repairs, and demands upon highly skilled operation and physical exertion. Their place is to be taken by a flexible power which may be so manipulated that it is at all times just equal to the power and speed desired.

Regulation Through the Engine

Hence the modern gasolene motor for vehicles that are not specially intended for the race track is provided with a more or less efficient throttling device by which the quantity of gasolene vapor admitted for each explosion may be varied at will, and a sensitive spark-timing device which is operated as a motor brake, and it is hoped that by controlling a motor perfectly obedient to these instrumentalities it will prove equal to the great variations in its work, independently of any but a single reduction and transmission gear between motor shaft and wheel axle.

So it would if the maximum power of the motor could practically be made very much greater—say ten times greater—than required for average work, and if this large motor could also in all cases be operated successfully very far below the average rate of work.

The Advantages of Steam

The steam engine satisfies the latter requirement and herein lies its greatest advantage over the explosive motor, and the explanation of the fact that the modern steam motor vehicle was the first to be operated with a single transmission gear. It has no special troubles at low speed and small traction resistance. The two power strokes of its pair of pistons for each revolution of the motor shaft, in conjunction with throttled steam admission, have proved adequate—even without a cut-off—to make a light vehicle crawl along as slowly as could possibly be desired on smooth and level ground. And as long as the steam vehicles remain light weight, high steam pressure and full admission seem to be nearly satisfactory for overcoming the resistance offered by steep grades, bad roads, and whatever load the vehicles can be made to carry.

Making Steam Vehicles Heavier

There is now, however, a pronounced tendency to construct steam vehicles much heavier than they were at first, and the bulk of boiler and tanks leaves no other method for increasing the power of the engines correspondingly than to work with higher steam pressures. The other alternative is to add slow speed gearing in the transmission mechanism.

Engine Speed Versus Horsepower

The technical readers will pardon these (to them) self-evident statements of elementary facts which are rendered necessary only because a quiet canvass of daily newspaper men who write about automobiles, and should know as much about them as the general public, has shown that comparatively few understand that the horsepower of gasolene and steam vehicles is calculated at the highest motor speed and is reduced proportionately, as the motor speed is reduced by increased traction resistance.

They do not ordinarily comprehend that a vehicle of four horsepower at 400 shaft revolutions is reduced to a little less than two horsepower when a hill is climbed which would drag the motor down to 200 revolutions per minute at unchanged steam admission or explosive charge; in other words, that the more power required the less is available, unless the power is converted into speed.

By Way of Example

Against this difficulty, which absolutely bars the gasolene motor vehicle operated without variable speed gears, from developing its full power except at speed work, the steam vehicle has the resource of increased steam pressure, the expediency of which is debatable when the question is of vehicles intended for the general public; besides that, the rapid steam generation calls for boilers of unwieldy size.

Just what the difficulty means for gasolene vehicles is a more complicated question, and may be best illustrated by an example. Suppose a gasolene vehicle is fitted with a six-horsepower motor and weighs one thousand pounds. The horsepower is figured at 800 revolutions per minute, and the motor is capable of reaching this figure with a light load. By throttling the ignition adjustment the motor speed can be reduced to fifty revolutions with the same light load, and to 100 revolutions with a heavier load. Few if any motors will do better.

Throttling the Motor

The designer, confident of having a highly flexible and efficient motor, decides to operate from highest to medium speeds by adjusting the ignition alone, never throttling the mixture except below the medium and average speeds. He does not want to interfere with efficiency and complete combustion. He therefore connects the motor shaft to the driving axle by a reducing gear, which would give the vehicle a speed of twenty miles per hour at 800 revolutions, this being the maximum speed desired. By retarded ignition he reduces—or, rather, brakes—the power down to the point where it will produce about 300 revolutions with the average load, traction and air resistance and friction of transmission gears. He could brake the power down still lower by the ignition device, but for the lower speeds he prefers to throttle the mixture, because the ignition device becomes too sensitive with the reduced momentum of the flywheel.

Tests Appear Satisfactory

His calculation is that the speed ordinarily required will be about

x:20 miles ::300:800,

making x equal 7½ miles, and that the inexperienced customer will find it easy to slow down by operating the trottle lever, and to speed up by operating the ignition lever. He tries the vehicle with this simple gearing, being desirous of avoiding mechanical change gears as much as possible, but well aware that he probably will be obliged to add one gear for slow speeds and heavy loads, besides a reverse gear. On the fine level roads in the vicinity of his shop he finds that he can actually run at 1¼ miles per hour, the motor being throttled down to fifty revolutions. He can also reach a speed of twenty miles, and he can manage all the intermediate changes.

His friends begin to persuade him that he has a "world beater."

But There Are Bad Roads

He almost forgets that bad roads and hills exist and that it may be necessary for the user of a motor vehicle once in a while to strap a couple of heavy trunks onto it, if it shall be as useful to him as his horse and spring wagon. However, he is wiser than his friends, and starts out, all alone, expecting trouble, for some sandy stretches of road, where the wheels of the vehicle sink deeply into the surface. He gets over the first stretch by full mixture admission and most advantageous spark timing, reaching firmer ground at a speed of about five miles per hour, but full of misgivings because he was obliged to turn on all his power to avoid a threatened dead stop when attempting to go more slowly.

He quickly figures out that he did not have more than 1½ horsepower at disposal to pull his 1,000-pound vehicle,

plus its load, through the sand, because his six horsepower was only going at one-fourth of its best speed. When he attempted to go slower he had still less; but he was a little puzzled to explain why less power was not sufficient for less speed on a bad road, as well as on a good road, until he came to remember that there might be something in the nature of loose sand to make the slow speed specially un-economical, so that a loss of power by the slow speed would be without any compensating advantage in a proportionately smaller requirement for power. Perhaps he could rig up something to make all four wheels drive, he mused, but abandoned the thought upon remembering that his object in not yet having a special slow-speed gear was to avoid such and similar complications.

Facing a Grade

In front of him was an incline of about four percent, good, hard road. He would take that with a rush and turn around and come back and see how slowly he could mount it. It was somewhat over 1,000 feet long, with a fifty-foot rise. The vehicle and driver made 1,200 pounds. Was there anything to hinder him from taking that little grade at a twenty-mile clip, considering that the limit speed of his motor was controlled by a governor —partly to be sure of ignition and partly to protect his prospective customers against the fascinating but dangerous higher speeds?

Figuring It Out

He had not figured closely on traction resistance and friction, but lumped them at about fifty pounds and 10 percent, respectively. The friction would reduce the customary horsepower of 33,000 foot-pounds to about 30,000. The traction effort at fifty pounds would mean 83,000 foot-pounds per 1,000 feet at a twenty-mile gait, equal to 1,000 feet in 6-10 of a minute. Counting his power at 6 times 30,000, or 180,000 foot-pounds, he should, in 6-10 of a minute, have a surplus of nearly 25,000 foot-pounds to overcome air resistance; but he did not know exactly how much of this surplus was used up and how much there would be left available for climbing the five percent grade before him. He came to a full stop in order to consider what the grade really amounted to; it seemed steeper the longer he looked at it, and, being alone, he did not relish the thought of sticking midway on the hill, unable to proceed either way.

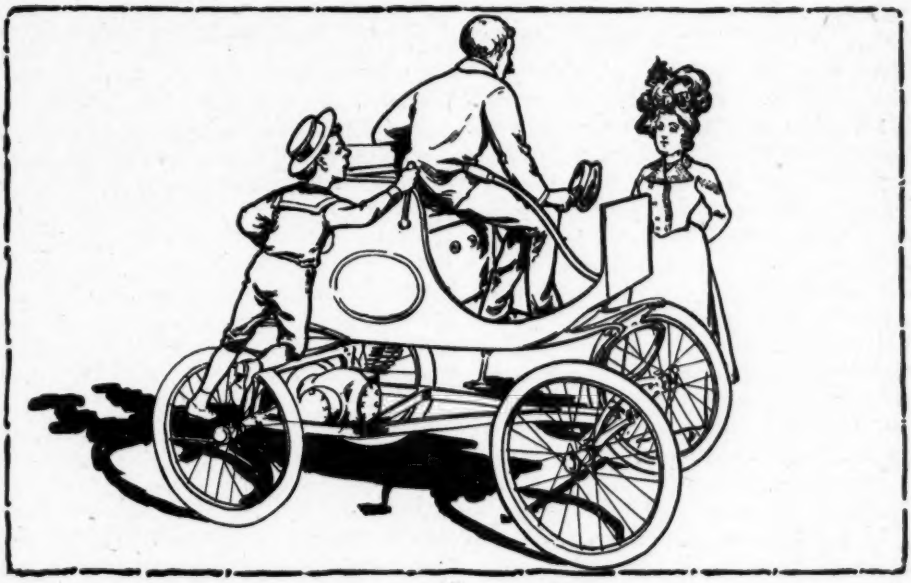
Lifting 1,200 pounds fifty feet in 6-10 of a minute, it was soon realized, called for 100,000 foot-pounds in addition to his traction effort—just four times his surplus for air resistance on the level—and the air resistance on the hill would be the same.

High Speed Impossible

Evidently it would be absolutely hopeless to attempt high speed. But how about a slower gait? Here was an instance where air resistance was blessed. It would diminish with the square of the speed; a highly satisfactory and providential arrangement, since the motor would lose no power by the slower gait contemplated, while the 100,000 foot-pounds required for the lift would only be reduced in direct proportion to the speed. But it might be safer to figure somewhat before trying, so as to find what speed would give him the best chance. Traction plus lift, plus air resistance, would have to equal the variable power at some point on the scale, or else he would not be able to get over the hill at all at any speed.

At this interesting point in his calculations he may be safely left until another issue of The Motor Age.

MAKING AN IMPRESSION



"It is as safe as a kitten, Miss Bullion. Why, a child can handle it."

Which was demonstrated.

CONSTRUCTION OF A MOTOR VEHICLE

THE PRACTICAL CONSTRUCTION OF A MOTOR VEHICLE ADAPTED FOR USE IN CONNECTION WITH THE FOUR-HORSEPOWER GASOLENE MOTOR ALREADY DESCRIBED IN THE MOTOR AGE

BY L. ELLIOTT BROOKES

PART III.

The present chapter deals with the construction of the transmission mechanism.

Fig. 11 shows a section of the assembled mechanism of this gearing, viewed from the front, with the brake wheel and the casing of the differential gear attached to the sleeve thereof. The bevel pinion which drives the transmission gearing is shown at the top of the figure, so as to establish its relation to the mechanism. In reality, the axis of this bevel pinion lies in a plane at right angles to the plane of view shown, and the pinion is located at the rear of the other parts, and, therefore, would not be shown, if a drawing true to plan were given.

The secondary shaft, which carries the driving sprocket wheels, passes through the hollow transmission shaft. It is cut in two at the center of the differential gear casing, which is shown at the right hand side of Fig. 11, and each portion carries a bevel gear upon its inner end which meshes with three bevel pinions, carried upon three studs mounted in the center portion of the differential gear casing. Thus the driving wheels are free to rotate at different speeds when the vehicle is turning corners through the medium of this differential gearing, mounted upon the end of the transmission gearing.

In describing the transmission gearing, it will be described as viewed in the drawings, so that the description can be followed more readily. It must be remembered, however, that the parts shown in the left of the drawing are really on the right hand in the vehicle (as the operator is seated therein), and vice versa. The operation of the mechanism is as follows: When the bevel pinion is rotated in a left hand direction, viz.: when it is turned around in the opposite direction to the honds of a clock, in the position shown in the drawing, the right hand bevel gear is rotated towards the observer, from the top, and the left hand bevel gear is rotated in a direction away from the observer, from the top. If the double-ended, male portion of the cone clutch, located upon the transmission gearing sleeve, be moved towards the right until it engages with the female portion of the clutch, within the periphery of the right hand bevel gear, the power will be transmitted through the clutch to the hollow shaft, thence to the differential gear, thence to the secondary shaft (within the hollow shaft) and thence to the sprocket wheels, chains, and traction wheels, and the vehicle will be driven in a forward direction. If, however, the double-ended, male portion of the cone clutch be moved towards the left, until it engages with the female portion of the left hand bevel gear, the vehicle will be caused to move in a backward direction, in the manner before stated. These engagements are both for slow speeds. When the fast speed is required the controlling lever is moved so as to just withdraw the double-ended male portion of the cone clutch from engagement with the female portion, within the periphery of the right hand bevel gear, and left in this position. (Taking for granted that the vehicle is in motion with the forward slow speed in gear, as it would be very unwise for the operator to attempt to start the vehicle from a standstill, with the fast speed mechanism.) The fast speed is now brought into play through the medium of the brake band, which embraces the exterior of the internal gear, shown to the right of the slow forward speed clutch. The application of the brake band to the brake wheel, which surrounds the internal gear, causes a re-

tardation of its rotation, and a gradual increase in speed of the vehicle from the slow speed up to the limit of the fast speed. The internal gear is then at a standstill, locked by the brake band. Any speed between the maximum of the slow and fast speeds may be obtained by varying the pressure of the foot upon the fast speed controlling lever. The small pinions carried on the back of the right hand bevel gear, are thus rotated upon their own axes, and impart a speed of rotation to the hollow shaft (through the gear to which it is keyed which is in mesh with these pinions), of twice that of the right hand bevel gear.

The double-ended male portion of the cone clutch slides upon a sleeve keyed rigidly to the hollow shaft, and is movable only longitudinally upon this sleeve, a feather key preventing any rotary movement between the sleeve and the male portion of the cone clutch.

If the motor be kept running while the vehicle is standing still the male portion of the cone clutch is in a central position, between the bevel gears, which rotate idly upon the transmission gearing sleeve, while the brake wheel, differential gearing casing, and hollow transmission shaft remain stationary.

For the convenience of the builder all the principal dimensions, overall and otherwise, pertaining to the proper putting together of the transmission gearing mechanism, are clearly given in Fig. 11. When the different parts have been machined and put together, if they should not come out right, the error can be readily located by comparing the different dimensions as given, with the actual work.

Fig. 12 shows the left hand bevel gear (as shown in Fig. 11), for the backward motion of the transmission gearing. This is of phosphor bronze, and needs a pattern. Allow for finish wherever shown in the drawing, and also allow 3-16 of an inch to the foot for the shrinkage of the casting.

Fig. 13 shows the forward speed bevel gear, which is also of phosphor bronze. The same directions as for the other bevel gear should be observed for finish and shrinkage.

Fig. 14 is the bevel pinion which drives both the forward and backward bevel gears. This should be made from a forging of high grade steel, if possible. The use of a forging eliminates the factor of having the grain of the metal lengthwise of the teeth, which will be the case if round bar steel be used. The keyway should be cut and the tapped hole located, as shown.

After the bevel gears, shown in Figs. 12 and 13, have been turned up in the lathe and the clutch recess properly bored (a lathe with a compound slide rest is necessary) and the teeth cut in them, the holes on the back of the forward speed bevel gear (Fig. 13) should be carefully laid out, exactly equi-distant from each other, and drilled and tapped as shown. To do this properly a piece of cast iron or steel should be procured, and a hole cut in it large enough to receive the end of the hub which projects through the clutch recess. This piece should be thick enough to prevent the end of this hub from coming through it and have its opposite sides perfectly parallel. The gear should be clamped, on top of this piece, firmly to the table of a large drill press (preferably back geared), and the tap holes drilled. They can then be tapped while still in position. After removing the tapping drill from the chuck or socket substitute a center in its place, which should be used to guide the tap into the holes to insure the holes being tapped out exactly at right angles to the back of the gear, which is absolutely necessary if the pinions are expected to be a nice running fit, and to mesh properly with the internal gear.

Fig. 15 shows the studs and washers for the three pinions which go upon the back of the left hand bevel gear (Figs. 11 and 13). These are of steel. That part of the stud upon which the pinion rotates should be left a trifle longer than the width of the pinion, so as to allow an easy working fit, and to prevent the washer from binding the pinion. A small pin, as shown in Fig. 11, should be put in the outer end of each stud to prevent the washer from turning and thereby, perhaps, causing the screw to work loose. These pins should be made from about

No. 42 Stub's steel, and be a driving fit in the hole in the end of the stud.

The pinions which go upon these studs are shown in Fig. 16. These should be made from a good quality of annealed tool steel, and be a nice working fit upon the studs.

The internal gear, Fig. 17, comes next in order. Two patterns are required for this, one for the internal gear ring, which has to be made separate from its hub, on account of cutting the teeth, and another for the hub or disk which carries the internal gear ring. The internal gear ring is of phosphor bronze, and the hub or disk should be made of cast or semi-steel. Do not attempt on any account to make a cast tooth internal gear,

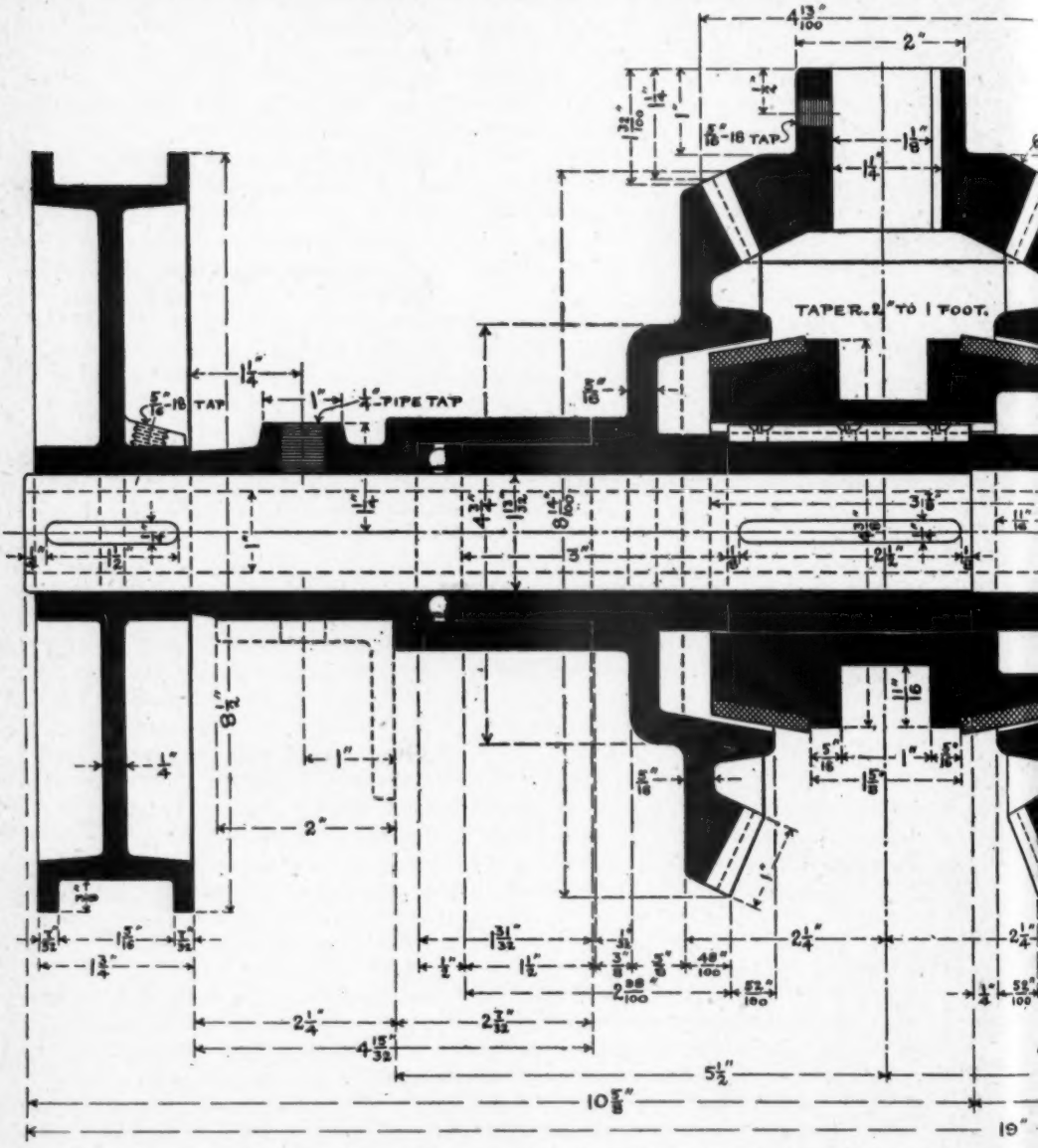
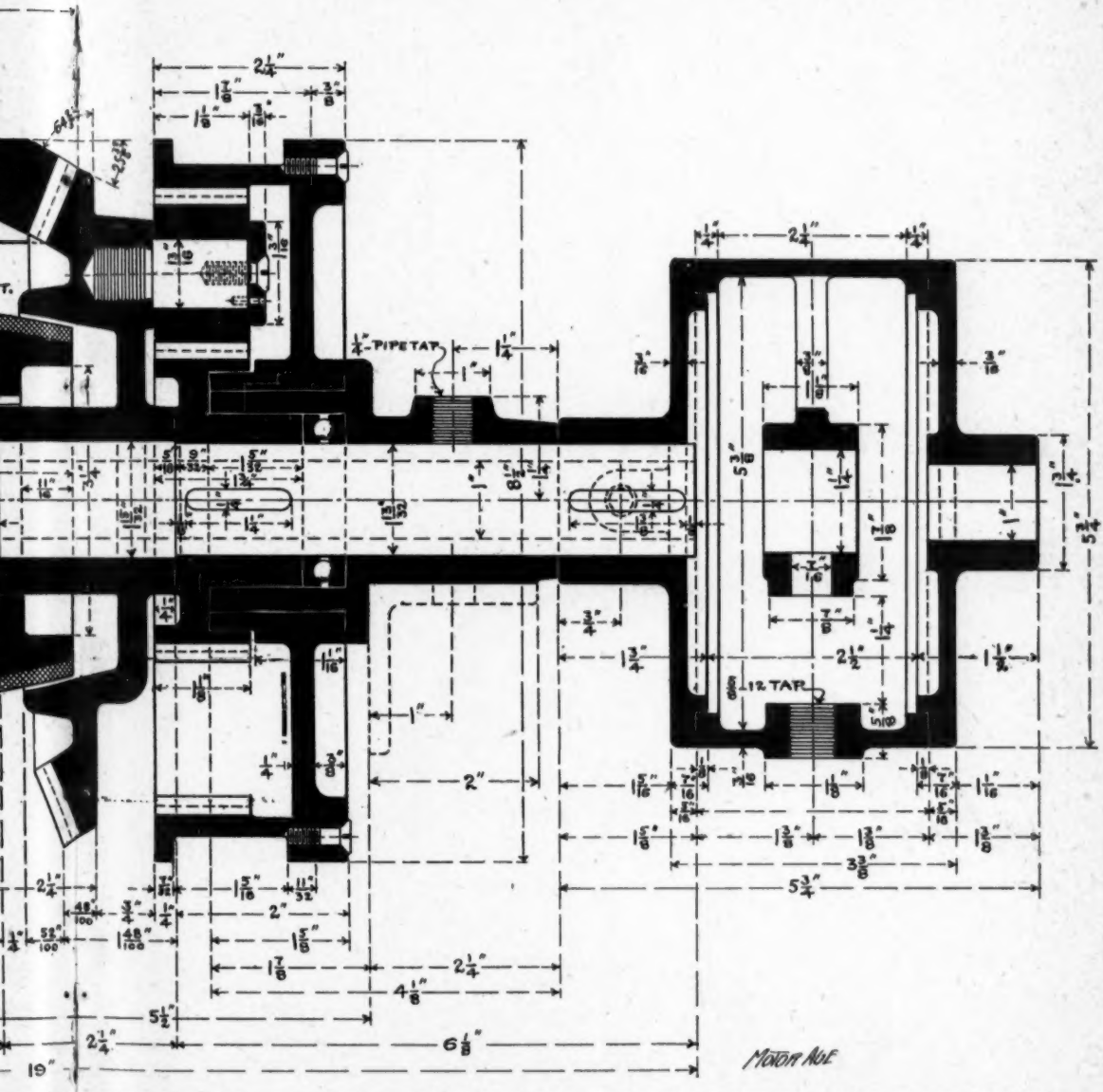


FIG. 11.—SECTION OF THE ASSEMBLED MECHANISM OF THE TRANSMISSION GEARING, A GEA

as it will not work properly, and will not save time and cost, but only cause lots of trouble, and will finally be thrown in the scrap heap. The

a better looking and more workmanlike job than will be obtained trying to countersink the screw heads flush with the face of the flange of the hub or disk. The



RING, AS VIEWED FROM THE FRONT, SHOWING, ALSO, THE BRAKE WHEEL AND DIFFERENTIAL GEAR CASING.

internal gear ring is attached to the hub or disk by means of eight ¼-inch, 20 thread, flat head screws. The heads of these screws should be slightly rounded off, as shown in Fig. 11. This will make

same should be done with the screws holding the washers in place upon the pinion studs (Fig. 15). This is a very simple operation and a quick one. Take a piece of, say, ½-inch round steel, true

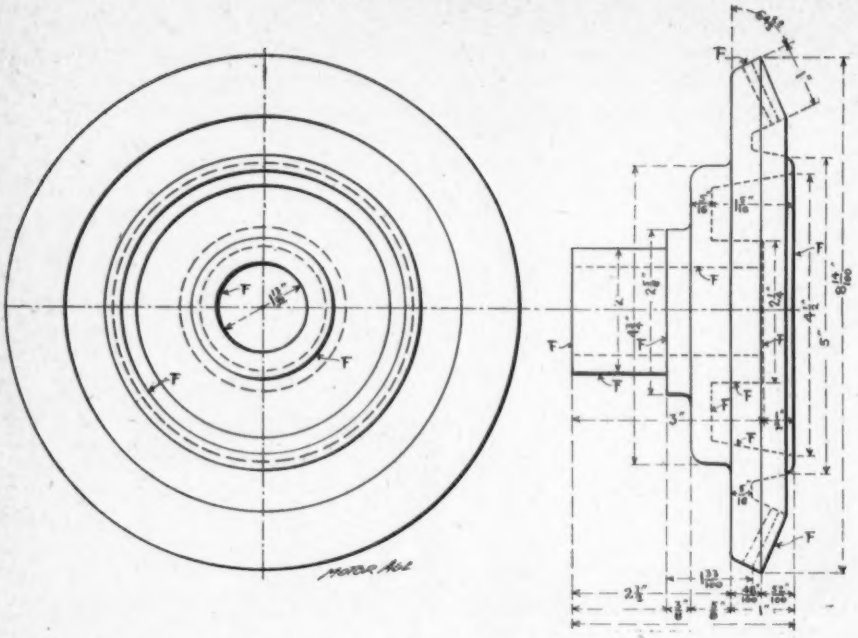


FIG. 12.—RIGHT HAND BEVEL GEAR BLANK (LEFT HAND IN FIG. 11).
1—Phosphor Bronze.

8-inch Pitch Diameter.
48 teeth—No. 6 Diametrical Pitch.
Pitch Line Angle—64 degrees, 25 minutes.
Face Angle—66 degrees, 34 minutes.
Cutting Angle—61 degrees, 57 minutes.
Taper of Clutch Recess—2 inches to 1 foot.

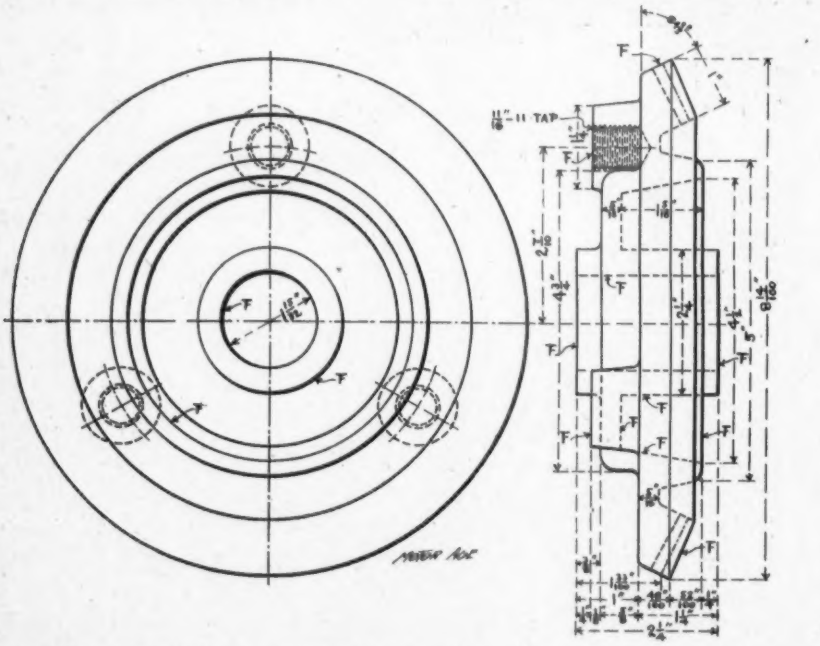


FIG. 13.—LEFT HAND BEVEL GEAR BLANK (RIGHT HAND IN FIG. 11).
1—Phosphor Bronze.

8-inch Pitch Diameter.
48 teeh—No. 6 Diametrical Pitch.
Pitch Line Angle—64 degrees, 25 minutes.
Face Angle—66 degrees, 34 minutes.
Cutting Angle—61 degrees, 57 minutes.
Taper of Clutch Recess—2 inches to 1 foot.

up in a lathe chuck, drill and tap a ¼-inch, 20 thread hole in the outer end. Put the screws into this hole, one at a time, with a screw-driver, and bevel or round off the heads as shown. It will take only a few minutes' time, and will make a neat looking job when done.

Fig. 18 shows the spur gear which goes upon the transmission gearing sleeve. It is made of phosphor bronze, and a pattern is required for it. A keyway ¼ of an inch wide must be cut in this gear, ⅛ of an inch deep, as shown, also a 5-16-inch, 18 thread, tap hole for a headless, cup point, set screw, ⅜ of an inch long. This hole may be drilled with a tap drill, but should not be tapped out until after the gear is fitted in place,

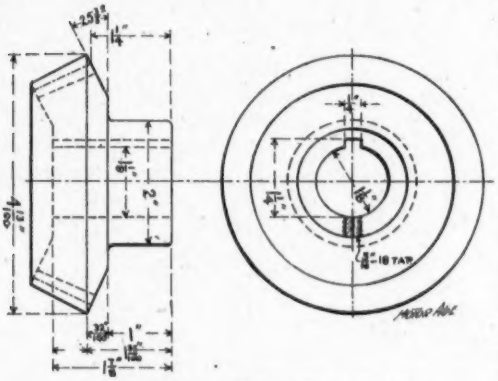


Fig. 14.—Bevel Pinion Gear Blank.
1—Steel.
3 5-6-inch Pitch Diameter.
48 teeth—No. 6 Diametrical Pitch.
Pitch Line Angle—25 degrees, 35 minutes.
Face Angle—27 degrees, 44 minutes.
Cutting Angle—23 degrees, 7 minutes.

with its key, upon the hollow transmission shaft, when the tap drill can be run far enough through this hole into this hollow shaft to insure the headless, cup point, set screw being flush with, or slightly below the outside of the hub of the spur gear. The teeth of all these gears (viz.: the three pinions, the internal gear and the spur gear which goes upon the hollow shaft) comprising the fast speed mechanism, are of No. 10 diametral pitch, and should be very nicely cut, if smoothness of running and proper working is desired.

The left hand bearing bracket for the transmission sleeve is shown in Fig. 19, and the right hand bearing bracket in Fig. 20. These should be made of phosphor bronze, and require patterns. In making these patterns careful attention should be given to allowing for finish, as shown in the drawings,. especially in the ends of the chambered portion of

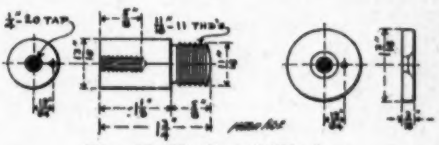


Fig. 15.—Stud and Washer.
3 each—Steel.

the bracket, where the ball-bearings go.

The shoulder which goes next to the supporting angles, h and i, of the frame (Fig. 5) should be left a trifle full, when being machined, so as to be on the safe side, in case the frame angles should be a little wide, or the overall measurement of the transmission gearing mechanism should come a trifle short.

The bosses on top of the bearing proper, on these brackets, are tapped out for ¼-inch pipe tap, for solid grease lubricators.

Fig. 21 is the detail of the cup for the end thrust ball bearings, which are plainly shown in Fig. 11. These should not be omitted, as they reduce the friction caused by the end thrust of the cone clutches, and also that caused by the bevel gears. It is not a great deal, but every little saving counts in reducing the friction of the working parts, especially with a motor of small horsepower. Twen-

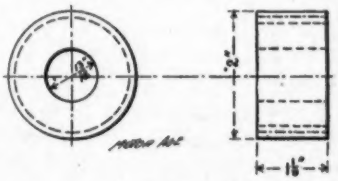


Fig. 16.—Pinion.
3—Tool Steel.
1 8-10-inch Pitch Diameter.
18 Teeth—No. 10 Diametrical Pitch.

ty-one ¼-inch balls are used in each ball bearing. These cups should be made from machinery steel of good quality, case hardened, and afterwards polished. Care must be taken to get each half exactly like the other, so as to insure a perfect bearing of the balls. Do not try

to make a three-point bearing of the bicycle type. The writer did so, on the advice of a bicycle expert (before using the form shown), and it took two men nearly three days to get the transmission mechanism apart, and get out the broken cups and pieces of balls. The form of end thrust bearing shown in the drawings, has stood the test of heavy usage in wire insulating machinery used by one of the largest electrical concerns in the United States, and is used by them in preference to any other. It is not, perhaps, quite as anti-frictionless as the bicycle type (two or three point) bearings, but it will be there doing business when the other style is all cut to pieces.

Fig. 22 shows the sleeve, which is keyed to the hollow transmission shaft, and upon which the double-ended, male portion of the cone clutch slides. This clutch is held from turning upon the sleeve by means of the feather key shown, and, while it can slide freely longitudinally, is forced to turn with the sleeve and hollow shaft. This sleeve is made of cast iron, and is held in place on the hollow transmission shaft by a headless, cup point, set screw ½ of an inch long, which goes into the hollow shaft a sufficient distance to hold the sleeve in place, and also to bring the headless, cup point, set screw flush with the outside of the sleeve. The feather key is secured to the fixed sleeve by means of three No. 6, 32 thread, flat head, machine screws, ½ of an inch long.

The double-ended male portion of the cone clutch is shown in Fig. 23, this is also of cast iron, and a pattern is needed for it, allowing ⅛ of an inch to the foot for shrinkage. If a lathe with a compound slide rest is not handy, the taper must be turned on the cones by setting the tail stock of the lathe over the required amount, to give the desired taper. The keyway shown must be made a nice sliding fit upon the feather key in the fixed sleeve (Fig. 22), but without any shake to it.

The leather facing for these cones (shown in Fig. 11) should be made from double thick leather belting 1¼ inches wide. Select a piece long enough to make two, and take care not to get a piece with a splice in. This should be looked into before any work is done upon the piece. Soak the leather in warm

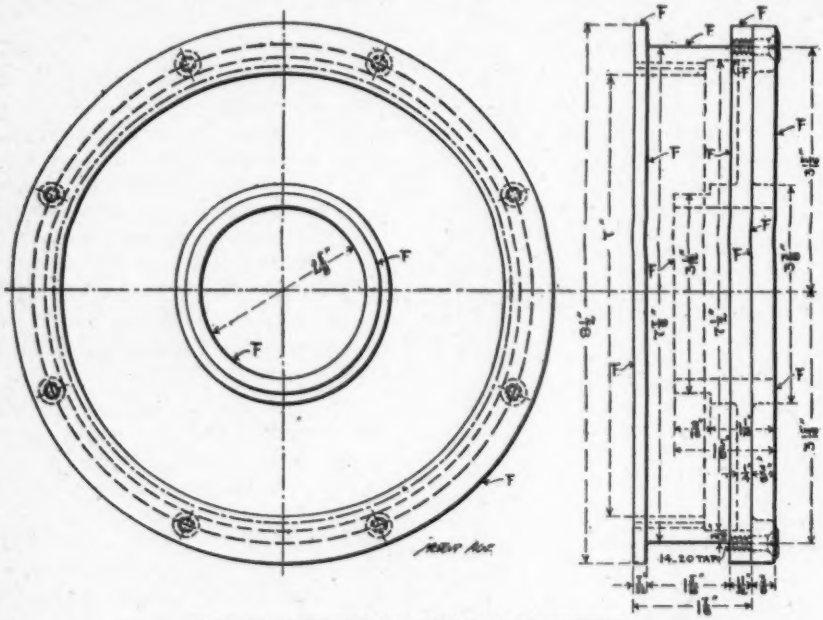


FIG. 17.—INTERNAL GEAR (COMPLETE).

1 Disc—Cast Steel.
1 Ring—Phosphor Bronze.
7 2-10-inch Pitch Diameter.
72 Teeth—No. 10 Diametrical Pitch.

water (not boiling) for about 10 or 15 minutes, or until it can be bent to shape easily. Cut to the shape of the cone, and leave the ends about 1-16 of an inch

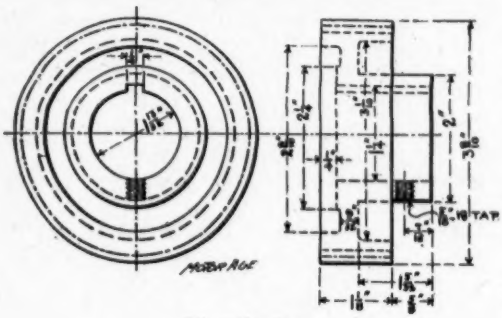


Fig. 18.—Gear.
1—Phosphor Bronze.
Finish All Over.
3 6-10-inch Pitch Diameter.
36 Teeth—No. 10 Diametrical Pitch.

open. Now take the leathers to a harnessmaker or a shoemaker and have the ends sewn together by what is known to the trade as invisible stitching. This being done, get some of Major's leather cement and cover the surface of the cones with it thoroughly, but not too thickly. Moisten the leather cups with warm water and wipe off dry. Then apply some of the cement to their inner surfaces thoroughly, allow to stand a few minutes, then force the leather cups up onto the cones as far as they will go. Then take a flat block of wood and drive them on up to the shoulder. Put the double-ended cone part of the clutch with its leather cups, now in place, between the coned recesses of the two bevel gears, having the hollow transmission shaft in place before so doing. Get two pieces of hard wood about 12 inches square and 1½ to 2 inches thick and drill four 9-16-inch holes in each for ½-inch rough bolts, far enough apart to clear the outside diameter of the bevel gears. Put a hole in the center of each board, to allow the transmission sleeve to pass through, and then clamp the two bevel gears and the cone clutch tightly together. Allow to dry over night. In the morning take apart, and, commencing with the stitched joint, lay out center lines for three rows of holes for No. 4, 36 thread, flat head, machine screws, ½ an inch long, one row in the center of the

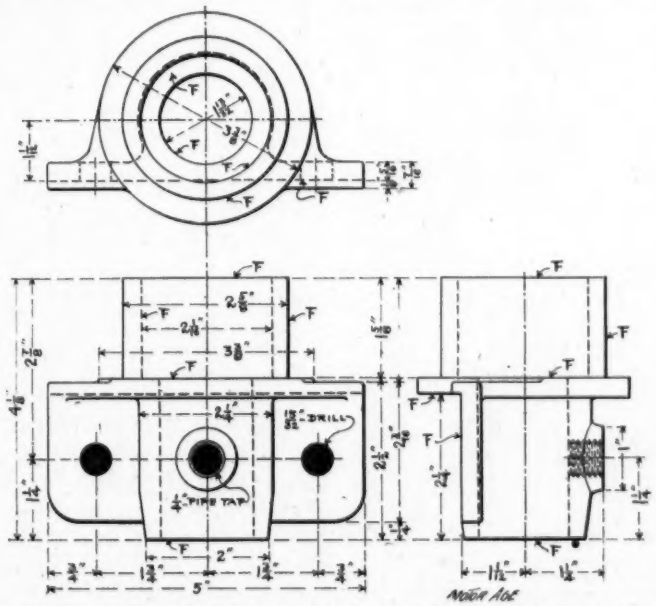


FIG. 19.—RIGHT HAND BEARING BRACKET (LEFT HAND IN FIG. 11).
1—Phosphor Bronze.

leather and the other two ⅜ of an inch from each edge. Put in two holes on each side, ⅜ of an inch from the joint, one in each outer row. Then space off the rest, one, two, alternately

around, until there are twelve screws in all, including the four at the joint, in three rows, staggered. When this is done the double-ended cone can be put on a mandril in a lathe, and the leather

the center portion. This should be made of steel or semi-steel castings. Three patterns are needed, the center portion requiring a core box as well.

The large hub on the left hand side of

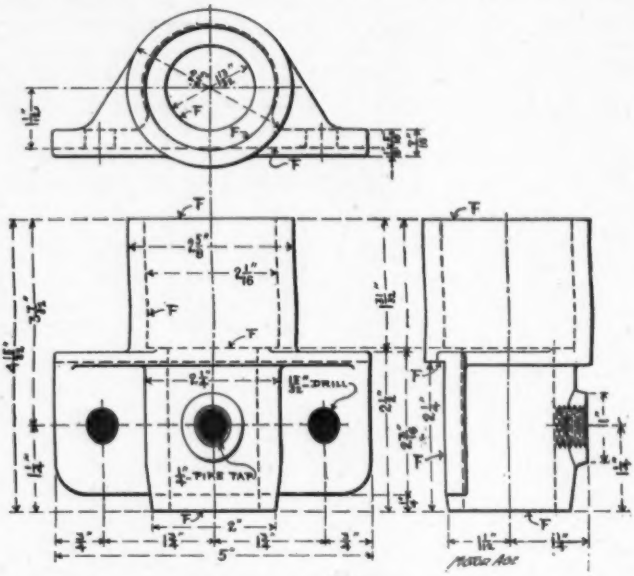


FIG. 20.—LEFT HAND BEARING BRACKET (RIGHT HAND IN FIG. 11).
1—Phosphor Bronze.

turned down almost to size. The holes for the screws should be countersunk deep enough so that the countersink touches the iron portion of the cone, so as to leave the heads of the screws well below the surface of the leather. Do not try to fasten the leather portion of the cone clutches to the iron parts, by means

the differential gear casing goes on the end of the hollow transmission shaft as shown in Fig. 11. The small hub carries one end of the secondary shaft which is free to rotate in the hole in it. The large hub is fastened to the transmission sleeve by means of a key in the hollow transmission shaft as shown, the keyway,

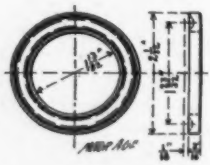


Fig. 21.—Ball Bearing Cup.
4—Steel (Case Hardened).

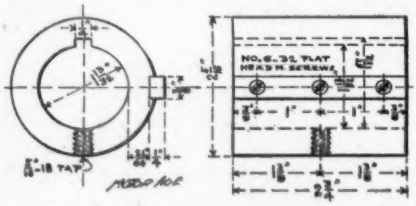


Fig. 22.—Sleeve.
1—Cast Iron.

of common glue and shoe pegs, or anything on that order, as it will not give any satisfaction when done. The leather is liable to come loose the first time the clutch is used.

Fig. 24 shows the differential gear casing, giving a side view of the complete casing, and also a separate view of

shown in the large hub of the differential gear casing, and set screw upon the key. The set screw boss is plainly shown on the large hub on Fig. 24. The three bevel pinions which form part of the differential gearing, are carried upon studs located upon the center portion of the dif-

ferential gear casing, and between its arms or spokes. The covers of the casing are secured in place by three ⅜-inch diameter, hexagon-head, cap screws, on each side, and are located concentrically

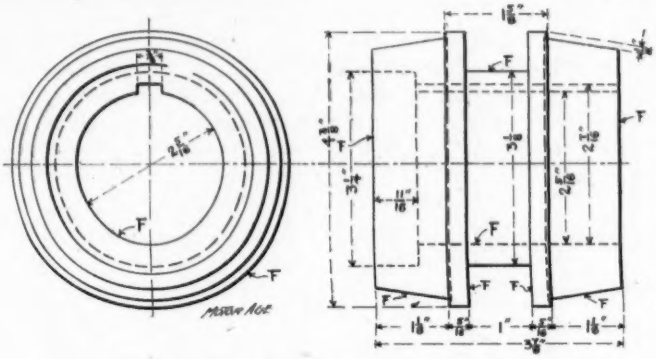


FIG. 23.—CONE CLUTCH (MALE PORTION).
1—Cast Iron.
Taper of Cones—2 inches to 1 foot.

with the center portion by means of shoulders as shown. The three bosses on the exterior of the center portion of the casing, are tapped out ⅝-inch, 11 thread, for the threaded portion of the studs, which carry the bevel pinions. The bal-

bored out. Then it can be placed upon a mandril and the ends faced off and counter-bored as shown. The end pieces are so simple that they need no explanation as to their machining. Care, however, must be taken in laying out the holes in the center piece for the studs which carry the bevel pinions. These had best be done (to get them exactly equi-distant and diametrically correct) by putting the center piece on a mandril

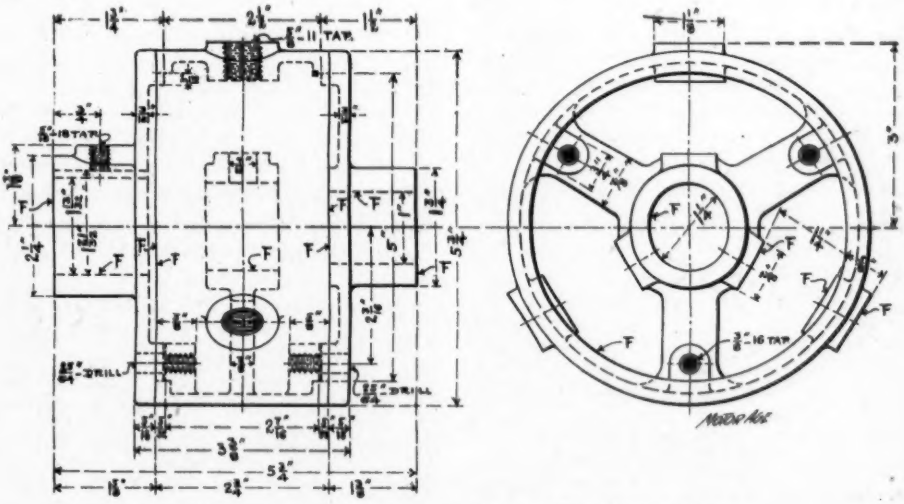


FIG. 24.—DIFFERENTIAL GEAR CASING (COMPLETE).
1—Cast or Semi-Steel.

ance of the body of the studs are 7-16 of an inch in diameter, and fit into the holes around the hub of the center portion. The center portion must first be held in a lathe chuck and the center hole and spacing and drilling the holes in a milling machine.

The hollow transmission shaft is so clearly shown and dimensioned in Fig. 11 that no other details are necessary.

It is made from a piece of a seamless, drawn, steel tubing, 1½ inches in diameter, with a ¼-inch wall. The keyways are shown correctly dimensioned and located and are cut only 3-32 of an inch deep into the hollow shaft, as it has been found, that, if cut deeper, and the parts going over them are made anything like a driving fit, there is a tendency to depress the metal at that point, and so obstruct the hole through the sleeve, through which the secondary shaft passes. This depth (3-32 of an inch), however, is sufficient for all purposes. The keys used in this sleeve are therefore ¼ of an inch wide and 7-32 of an inch thick and should be nicely fitted, both in the transmission shaft and in the parts to which they belong.

The brake wheel is clearly dimensioned in Fig. 11 and no further description is necessary. It should be of cast iron.

All dimensions not given in the detail drawing of the various parts will be found in the sectional drawing of the assembled mechanism (Fig. 11).

WEEKLY PATENT OFFICE BUDGET

Interesting variety characterizes the motor-vehicle patents in the last batch granted. There is one relating to flexibly attached axles for counteracting the influence of rough roads; one, of which an Italian is patentee, relating to the theoretically correct construction of steering gears to afford steering without slipping of either wheel; one which obviates rear axle compensating gears by providing an automatically operating drive wheel clutch whereby either rear wheel may be thrown out of driving connection when the vehicle is turning; one showing a German method of constructing flexible running gear frames; one foolishly providing a reverse mechanism for transmission gears whereby the speed of the vehicle is more than doubled when backing, and one relating to the method of supporting electric motors employed in the carriages of the Hewitt-Lindstrom Co.

The complete specifications, claims and drawings of any patents will be furnished by the patent office at Washington for five cents each. Persons sending for patents should address their letters "Commissioner of Patents, Washington, D. C.," and should enclose five cents for each copy of every patent desired, and should state the numbers and dates of the patents. Each patent described in The Motor Age is preceded by its number and date.

EQUALIZING AXLE SUPPORT

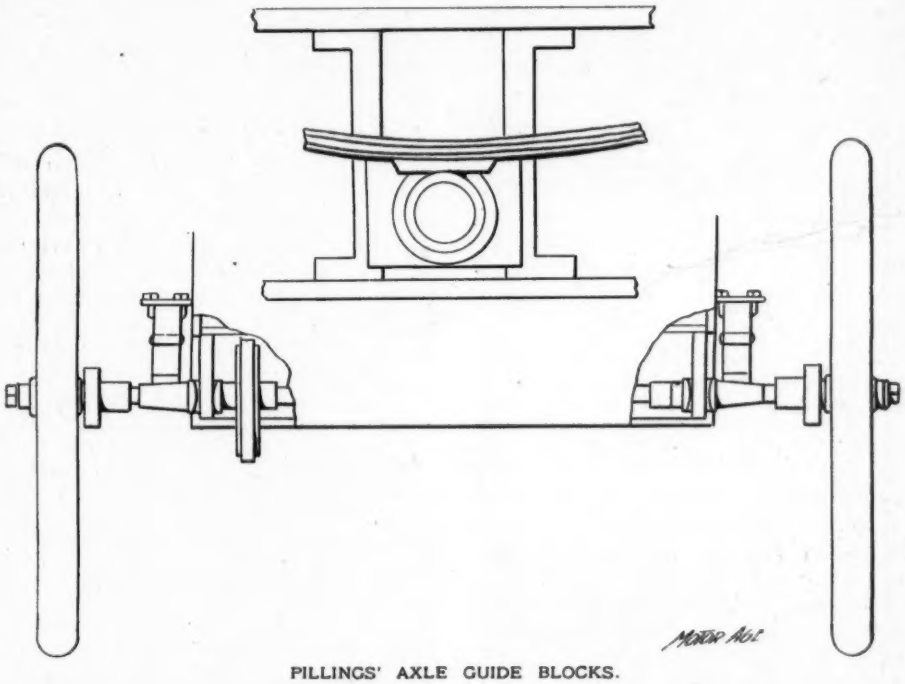
Letters patent No. 659,319, dated October 9, 1900, to George T. Pillings, Elgin, Ill.; running gear for motor-vehicles. Four claims allowed.

This invention relates mainly to the mounting of the front and rear axles that they may be free to oscillate vertically, within limits, inorder to allow the wheels of the vehicle to accommodate themselves to uneven surfaces. The running gear frame has side reaches consisting of a pair of bars one above the other and separated four or five inches. At the point where each axle end passes between these side bars the axle is provided with a box or hub having on each side vertical flanges with convex or rounded inner sides, and these flanges engage and are held between upright braces secured in pairs between the frame bars.

The outer ends of the rear axle and the center of the front axle are connected to the vehicle body by springs of usual construction.

As the frame reaches are attached rigidly to the vehicle body the spring connection between the body and the

axles allows the latter with their wheels to tilt or oscillate vertically, and as they are guided and retained by the axle box flanges which engage the jaw braces between the respective pairs of frame reach bars, they are prevented from moving in a horizontal plane. The front axle is fitted with regular steering knuckles and the driving connection to the rear axle may be of any approved construction.



PILLINGS' AXLE GUIDE BLOCKS.

RUNS FASTEST BACKWARD

Letters patent No. 569,581, dated October 9, 1900, to Avon M. Coburn, Daunt, Cal.; motor-vehicle. Nine claims allowed.

The above patentee has invented a vehicle having new features in many particulars and no obvious advantage in any. The most notable portion of the invention is the transmission gear which consists of an internal friction wheel and an external friction wheel mounted concentrically on the same counter-shaft. A friction wheel or pulley on the motor shaft is so located between them that it may, by means of the opening device, be brought into frictional engagement with either of the other two friction wheels, from whose shaft runs a chain drive to the rear wheel axle.

When the motor pulley is engaging the internal wheel the vehicle runs forward and when it is engaging the external wheel it runs backward and of course at an increased speed on account of the external friction wheel being much smaller than the internal wheel. The inventor states that by reversing the motor a fast forward and a slow rearward speed may be obtained, but as the motor shown in the drawings resemble a gasolene engine more nearly than any other possible motor and as ordinary gasolene engines cannot be reversed and as Mr. Inventor's vehicle is not constructed so that a steam engine or an electric motor could be very conveniently built into it, and as speed changing gears are not necessary with steam or electric motors, it is probable that the transmission device in question is practically only useful for backing at

fire-department speed and running forward at a funeral procession gait.

STEERING GEAR CONSTRUCTION

Letters patent No. 659,568, dated October 9, 1900, to Enrico Bernardi, Padua, Italy; steering and motor controlling device for automobiles. Three claims allowed.

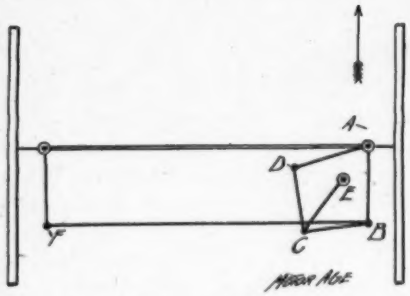


Fig 1—Bernardi's Steering Gear.

One portion of this invention relates to the construction of the steering mechanism of a motor-vehicle so that the front wheels will turn in proper angular relation to each other to obviate all slipping; the other section regards a pneumatic controller whereby the motor may be stopped or started or the speed changed without it being necessary for the operator to remove his hand from the steering lever. The part relating to the steering device is the most interesting, as it explains what is purported to be an exact method of calculating the proportional dimensions of the steering mechanism links, a task seldom attempted inasmuch as its complete solution involves higher mathematics and also as such common methods as that of disposing the steering knuckle cranks in lines which if projected will meet each other at the center of the rear axle give approximately correct results.

The accompanying figures show the Italian's method diagrammatically.

The principal portion of the device consists of a jointed quadrilateral A B C D, Fig. 1, the apex A only of which is fixed to the frame of the vehicle. An arm E C capable of rotation around a pivot E, is also fitted upon the frame to act as steering lever post, and connects at C with the rods B C D C of the quadrilateral. The connection between the two other rods A B and A D of the quadrilateral and the steering wheels should be effected in such a manner as to oblige these latter to describe, in turning, angles respectively equal to those described by the rods. One of the simplest of the several methods specified by the inventor for obtaining this condition is that shown in Figs. 1 and 2, in which the arm A B forms one side of a parallelogram A B F G. The steering knuckle for the left hand is rigidly attached to the arm F G and that of the right hand wheel to the arm A B. The movement, in turning the vehicle, of the parts so arranged, is presented in Fig. 2.

The operation of this steering device to furnish absolutely accurate turning relation of the two wheels thus depends upon the lengths of the side arms of the quadrilateral A B C D. In order to calculate the length of the members of the quadrilateral and the length of the arm E C the method represented in Fig. 3 is adopted by the inventor.

The front axle from one steering knuckle to the other is represented by the line H H, while J J represents the axle of the rear wheels of the vehicle. From the middle point M, of the line H H, the line M A is drawn at right angles to H H. Then the straight line A H and the straight line A K, bisecting the angle H A J, are drawn. An arbitrary length A D is taken upon A K commencing at

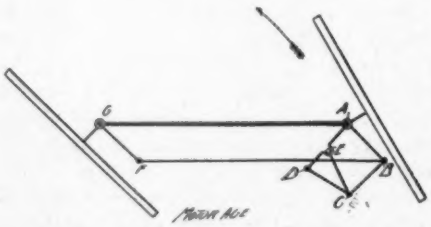


Fig. 2—Bernardi's Steering Gear.

A, and from D is drawn the line D L at right angles to J J. With D as center and a radius equal to D L, an arc of a circle is described which cuts A M at C. With the same radius and with C as

center A M is cut at E. A B and B C arranged symmetrically to A D and C D with respect to A M are then drawn, and in the quadrilateral A B C D and in the straight line E C a geometric representation to scale is obtained of the

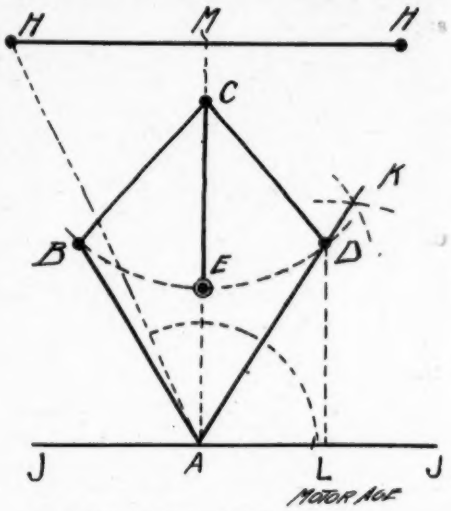


Fig. 3—Bernardi's Steering Gear.

quadrilateral and of the operating arm of the steering gear. The lengths of the rod of the quadrilateral A D and A B is fixed as taken. For practical reasons this length should preferably be between one-fifth and one-sixth of H H.

AN ACCOMODATING CLUTCH

Letters patent No. 659,222, dated October 9, 1900, to Claud H. Foster, Cleveland, O.; clutch for driving wheel of automobile. Six claims allowed.

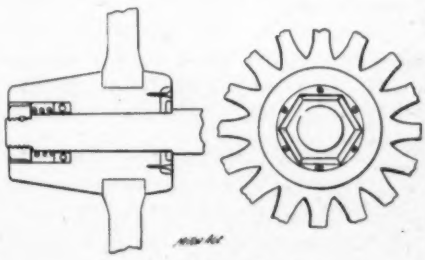
Here is the real thing. Mr. Foster wishes to obviate the differential gears commonly used on the rear axles of motor-vehicles. Hence he has invented a driving wheel clutch whereby either of the rear wheels may free itself from driving engagement with the shaft when going around turns. Upon the rear shaft is rigidly secured a hexagonal plate or clutch which normally engages a hexagonal recess in the hub of the wheel. The hub is bored to fit the reduced end of the axle, but at the outer end it is counter-bored to furnish a considerable recess around the axle. Within this recess is the axle end nut to prevent the wheel from slipping off its seat entirely, and behind the nut is a strong coil spring which bears against the outer of a pair of washers, the inner of which rests against the shoulder of the hub counterboring. The adjacent sides of the washers are grooved to afford raceways for a row of balls. It is evident (to the inventor) that when the vehicle is running on a straight line the springs, being equal in strength, will hold the body of the vehicle midway between the wheels, with the clutch members on each side in engagement. When a curve is rounded by turning to the right, for instance, the inertia of the vehicle will cause it to be carried to the left. This will hold the left-hand clutch members in full engagement and will pull the right-hand members entirely apart, thus leaving the right-hand wheel to rotate idly and independently of the driving-axle, which is turning the left-hand wheel. Of course when the vehicle takes a straight road again the independent wheel will become clutched to the axle, and as the wheel and axle are already turning in the same direction, there will be no perceptible shock due to the clutching action.

No comment seems equal to the occasion.

GERMAN VEHICLE FRAME

Letters patent No. 659,590, dated October 9, 1900, to Alberdt Muhlberg, Berlin, Germany. Flexibly running gear for motor-vehicles. Four claims allowed.

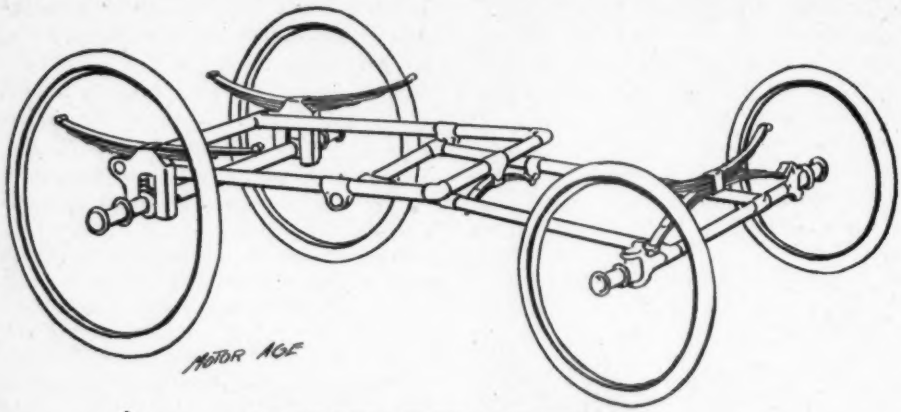
The frame comprises three parts and is



Foster's Driving Wheel Clutch.

designed to equalize the movements of wheels, body and motor when traversing rough roadways, without causing the frame parts to twist. The rear frame

comprises a rigid rectangular frame which is spring mounted upon the rear axle by guide blocks. The rear body springs are attached to this frame. The motor frame comprises two side arms hinged upon the rear axle. The motor axle extends laterally between their forreaches. These are loosely connected to the cross brace in the rear frame and are flexibly connected by a center-hung arch spring to the front bar of the rear frame. The front end of the body is supported by a pair of springs mounted upon the axle tree. The entire front frame is thus



MUHLBERG'S SPRING VEHICLE FRAME.

ward ends and a forward projection from the center of the motor casing is connected by balanced coil springs to a cross brace in the rear frame. The swinging movement of this motor frame is further controlled and limited by springs between rearward projections from the motor case and the rear axle. The side arms project rearwardly and are braced together by a cross rod. The drive gear and pinion covering also forms a part of this frame.

The front frame consists mainly of the front axle tree and a pair of parallel side free to oscillate in a vertical plane without affecting the rear frame or the body.

MOTOR SUPPORTING FRAME

Letters patent No. 659,539, dated October 9, 1900, to Charles A. Lindstrom, Chicago, Ill., assignor, by direct and mesne assignments, to the Hewitt-Lindstrom Motor Co., same place. Bracket for supporting the motor of an electric automobile. Two claims allowed. This bracket was illustrated and described in The Motor Age in the issue of July 12, 1900.

NEWS OF THE MOTOR INDUSTRY

A MANUFACTURER ARRESTED

New York, Oct. 11.—Leon Schermerhorn, manager of the Steam Vehicle Co. of America, last week was subjected to a taste of the annoyance steam vehicle drivers are now having at the hands of the police on the boiler inspection and engineers' license questions. A customer of the company had reported some difficulty with his Reading wagon. Mr. Schermerhorn had readily adjusted the difficulty and was taking the vehicle in a little trial spin to see whether it was in order, when he was stopped by a policeman. He showed an engineer's license and the boiler inspection was later found pinned under the seat. He explained he was a mere repairman, testing the vehicle, but the explanation was not satisfactory and he was taken to the sta-

tion house. The judge promptly dismissed the case.

There had been a decision by Judge Olmstead that no license was required for steam vehicles under ten-horsepower and under ten pounds pressure; but this does not seem to have any effect on the police.

An auto driver must now show an engineer's license and a boiler inspection certificate for the particular vehicle. No repairman can test a vehicle and if an owner has more than one vehicle in his stable he must show a certificate and license for each. It would seem as though the authorities were rather "rubbing it in."

Brandenburg Bros. & Wallace

R. D. Alliger has recently been added to the firm of Brandenburg Bros. & Wallace. This concern is devoting itself largely to automobile parts and fittings. They are selling agents for the Aurora Automatic Machine Co.'s Thorn roller bearings, John R. Keim's stamping and pedal fittings, the Duckworth Chain & Mfg. Co.'s chains, the J. J. Warren Co.'s grips and tool bags, and the Frederick Schrader wrenches, as well as other lines of automobile material.

New York Trade Notes

Mr. Otto, who is abroad in the interests of the Automobile Co. of America, is expected to return toward the end of the present month.

The Winton local agents, who have had out a sign promising delivery within fifteen days, now say that the manufacturing facilities of their plant have been so greatly increased that practically immediate delivery is assured.

Ralph L. Morgan, of the Automobile Patents Exploitation Co., has returned from a five weeks' trip to Europe. He has been investigating automobile manufacture at the Paris Exposition and at the various factories.

The General Carriage Co. is to build a twelve-story apartment house, with an automobile depot on the ground floor, to occupy the block between forty-third and Forty-fourth Streets, on Sixth Avenue.

Two representatives of the Philadelphia agency of the De Dion-Bouton Motorette Co. recently rode a motorette and tricycle from the Brooklyn factory to Philadelphia in six and a half hours.

William A. Gray, 26 Cortlandt Street, formerly well known in the bicycle trade in connection with the Janney pedals at Westboro, Mass., now has quite an extensive line of automobile material among the general factory material he handles as selling agent.

A. H. Overman, of the Overman Automobile Co., is expected to arrive here on Saturday. It is understood that he went abroad to interest Parisian capitalists in his automobile patents and improvements.

Richard Croker has retired from the Auto Truck Co.

NO LONGER BICYCLE ROW

Buffalo, Oct. 15.—Cycle Row is fast losing its identity. In the show windows of several of the salesrooms that have for years been resplendent with the different types of the cycle now contain displays of automobiles, while in others stoves and ranges, sewing machines, pianos and other wares are being as conspicuously displayed as was the bicycle.

The Mobile company is showing a full line of its vehicles in the store formerly occupied by the Lozier sales department of the A. B. C. Cleveland bicycles still occupy a position on the floor and Manager Robinson continues to hold forth in his old office, but how long this is to continue reports sayeth not.

A fine display of the Kensington product has superseded the bicycle at H. C. Martin's. It is said that Mr. Martin will drop the cycle entirely and devote his attention in the future solely to the sale of the Kensington carriage.

WASHINGTON AUTO SHOW

Washington, D. C., Oct. 12.—Recognizing the fact that the self-propelled vehicle, both as an industry and as a product, has today one of the most promising futures in any line of development that has taken place in the last few years, and desiring to stimulate local interest in this important branch of indus-

try, the promoters of the automobile show, to be held in this city during the week of December 10, are putting forth every effort to make it the most successful trade exhibition ever held at the National capital. Manager Reynolds says he has received applications for space from a number of the leading manufacturers of the country and the interest that the trade at large is evincing in the affair justifies the belief that it will be a success from every point of view.

Excepting two other cities, there are more automobiles in Washington than in any other city in the United States, and of all cities in the country it is best adapted for motor-vehicles, having wide streets and 210 miles of asphalt pavement. Within a radius of 150 miles from the city there are over four million inhabitants. There is in Washington capital waiting and anxious to be invested in the automobile business if manufacturers will demonstrate the ability of their machines. In the light of these facts it would seem that the forthcoming exhibition offers an exceptional opportunity for the motor-vehicle manufacturers of the country to bring their productions before the people of the nation's capital under highly advantageous conditions.

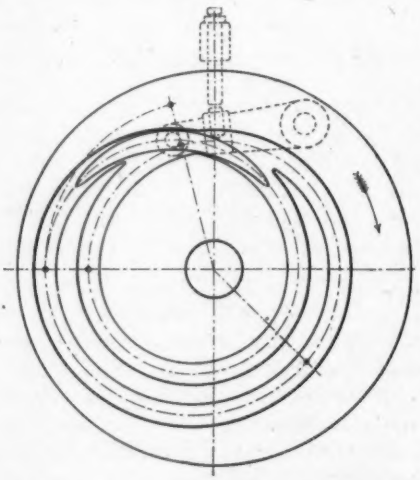
WANTS TO BUY AUTO PATENTS

New York, Oct. 14.—Martin D. Rucker, the English promoter, is in this country, in company with a British automobile scribe, for the purpose, so he stated, of purchasing "any good thing" in the automobile line. He will visit a number of gasolene vehicle factories, traveling as far west as Cleveland. It is generally understood that Mr. Rucker has been intimately connected with Lawson and Pennington, of Anglo-American Rapid Vehicle Co. fame, and with Ernest Terah Hooley, the notorious English promoter-bankrupt.

A NEW (?) EXHAUST VALVE DEVICE

Although there is no universally recognized "gas engine practice" as the corresponding term is used in regard to steam engines, still the gas engine is very old and has been the subject of investigation by thousands of bright minds. It is, therefore, hard to find much that is new in the construction of gas and gasolene engines, particularly in the way of mechanical movements. Still it remains for a motor vehicle journal published not a thousand miles from Cleveland to discover one that is a "radical departure" from anything that has been used before.

In this new construction, the gear and pinion, so commonly used in connection with the exhaust valve, are entirely dispensed with and the "radical departure" is used in its place. The exhaust valve is actuated through the medium of a small shoe which travels in a groove, cut in the outer face of one of the small flywheels, within the crank chamber of



the motor. The groove has a two-way control over the shoe, so as to operate the exhaust valve every second revolution, the same as is done by the ordinary two-to-one gear and pinion mechanism.

Gotleib Daimler, commonly known as "the father of the automobile," recently deceased, was, as far as known, the first to use this form of exhaust valve operating mechanism on a gasolene motor. Herr Daimler, however, discarded the device, after giving it a thorough trial, because, while it worked admirably when new, it produced, when a little worn, a violent hammering when passing through the frog or crossing of the grooves, especially at high speed. The bearing points

on the shoe wear so rapidly as to cause the shoe to be a poor fit in the groove in a short time. The accompanying illustration shows a modification of Daimler's mechanism. The shoe is pivoted to the lever shown in dotted lines, the lever raising the spindle of the exhaust valve, also shown in dotted lines, at the proper moment.

The form of mechanism shown was not new with Herr Daimler, except in its application. The writer saw similar grooved cams, having from two to five grooves, so that the shoe would become operative only once in the desired number of revolutions, in England, away back in the seventies. These cams were in use on weaving looms, in a large factory in Nottingham. On these slow working machines they were very satisfactory.

BACHELLE'S ELECTRIC CARRIAGE

Otto V. Bachelle, whose patent on electric vehicles was described in last week's issue of The Motor Age, takes exception to the statement that he was ever a bicycle racing man. He is an electrical engineer of repute and it was his brother who shone as a pedal pusher.

Mr. Bachelle has embodied his invention in a carriage of particularly pleasing design, which, according to the inventor, has been in use for the past nine months without the necessity of repairs of any kind whatever. It is compact, sets low, and the running gear, described in connection with the patent, is neat in appearance and mechanically designed to meet all the requirements of an automobile running gear, according to the ideas of The Motor Age.

CARRIAGE SHOWS IN NEW YORK

New York, Oct. 16.—Two big national carriage trades are now in session here and two big expositions are in progress. The Carriage Builders' National Association holds forth at the Grand Central Palace, where one of the New York automobile shows is to be held, while the Carriage Dealers' Protective Association exhibits at the St. Nicholas Rink. Both shows are well attended by exhibitors and visitors. The rubber tire trade is largely represented at both. Evidences are plentiful of encroachment on the domain of the automobile builder of the regular carriage trade, as well as of the tire trade. Manufacturers of automobiles are in attendance in considerable numbers, devoting their attention principally to examining the tires, wheels, gears, materials and accesories which are scattered thickly through both shows.

SOMETHING ABOUT SHOWS

There are showmen and showmen. There are showmen who conduct shows, of no matter what, solely for the money there may be in the venture, and there are showmen who, having in mind the welfare of the industry in which they are particularly interested, are willing to devote their time, energy and capital to the promotion of events which, they are convinced, will ultimately prove advantageous, expecting little in the way of immediate return.

There are always persons, devoid of the enterprise which prompts the promotion of such events, who are willing and anxious to decry the efforts of their more wideawake fellows. Their utterrances are prompted, not by a desire to assist the industry, but by pure selfishness. It appears that the automobile show to be held at the Coliseum next March has just one such critic. Let the trade judge of its sincerity by its future course.

The suggestion has been given prominence that a show promoted by the proprietors of a trade journal will lack the support of the other papers. For answer the reader and the critic are referred to the columns of the reputable journals of the trade, which have not only expressed willingness to lend assistance in promoting the success of an enterprise which they feel will benefit the industry, but have already given prominence to the details so far as they have been arranged. The trade is blessed with a number of journals whose publishers see beyond to-day and whose ideas are not warped by the one and only considera-

tion which actuates trade journalists of another stripe—the almighty dollar.

No great amount of investigation was necessary to discover that the trade was thoroughly disgusted with the treatment received at the hands of the promoters of the late show at Washington Park. The event was promoted without reference to the interests of the people who made it a possibility. The tactics of the amateur show manager were everywhere evident.

Before the event was announced the proprietors of The Motor Age had contemplated the promotion of a show in November. They had gone so far in the matter as to consult the trade as to the dates. Great things were promised at Washington Park, however, and The Motor Age people concluded to stand aside for the time, believing that two shows would be too many at this stage of the industry. As a result, the trade has had a taste of amateur show management. It has probably had all it wants of it.

The coming event will be managed on an entirely different plan. Its promoters are old hands at the business and have behind them the record of having promoted the most successful trade exhibitions, without a single, exception, ever held in the city of Chicago.

The show will be national in scope. It will be attended by people interested in the business from all sections of the country. As to the exhibitors, applications are already so numerous as to cause uneasiness about the ability of the building to accommodate them all. The trade evidently realize that a trade journal, thoroughly equipped to reach the members of the industry in the promotion of its own business, is of necessity better able than anyone else to reach them for show purposes and to insure their attendance.

So let the critic howl. Next March will find its policy marked by commendation of the people who exhibit and condemnation of the men who made it possible for them to do so—a clean case of impotent jealousy.

BRIEF NEWS OF THE INDUSTRY

The National Automobile & Electric Co. of Indianapolis are preparing an elaborate display for the Madison Square Garden show in New York.

J. B. Merriam, Century building, Cleveland, the manufacturer of the automobile charging outfit recently described in The Motor Age, write that a typographical error made his name appear as E. B. instead of J. B. Merriam. He also states that the speed of the 1800 should read 900.

Charles F. M. Kelly, general sales agent of the Pennsylvania Rubber Co., writes that his company is making a determined effort to obtain a large share of the trade in automobile tires. He says that the company will not make a cheap or medium priced tire, believing that "the best is not yet good enough."

The Waltham Mfg. Co. of Waltham, Mass., will exhibit at the Madison Square Automobile Show, in space "J," their complete line of motor bicycles, tandems, tricycles and quadricycles, as well as their Victoriette. Among the cycles exhibitited will be the tricycle on which Champion established the one-hour and fifty-mile records at Washington Park, Chicago, as well as numerous other records.